Coordinating Colors With Stat Control

Attitudes about color are pretty subjective—one person's blue is another's aqua. But when it comes to coordinating the colors of different car components, subjectivity has to be kept to a minimum.

"Colored components of the automobile are often manufactured in different plants," explains Dr. Lonnie C. Vance, a statistician in the Mathematics Dept. of GM Research Labs (GMR) in Warren, MI. "But when, for example, the glovebox door and ashtray are brought together in the instrument panel, their colors have to match.

"To ensure this, GM's Fisher Body has relied solely on highly trained observers who look at the components under special lighting and reject those not up to standard. The method has worked well, but Fisher Body wanted to make the process more automatic and less subjective."

So, GMR developed a technique that uses instrument measurements and statistical methods to make color matching more objective.

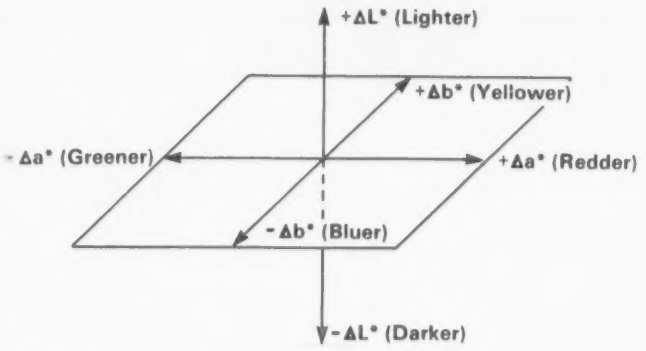
First, it established an acceptable/unacceptable standard for each color based on input from Fisher Body's observers. Then, to get a numerical reading, it measured reflected light with an abridged spectrophotometer and a colorimeter. After that, it was merely a matter of measuring a sample color with those instruments to see how near or far it was from the standard.

To ensure that the instrument readings correlated with the visual judgements, Vance used a statistical technique that classified the data of the samples on a graph. As it turned out, the samples that were measured by the instruments were in close agreement with the samples found acceptable visually.

This technique is now being used on a trial basis in several GM plants to standardize visual judgements of the color of incoming material. "I should add," says Vance, "that the system is intended to supplement visual inspection; not replace it." ■

—John McElroy

FIGURE 1
COLOR DIFFERENCES IN THE 1976 CIE L* a* b* (CIELAB) COLOR SYSTEM



GM Research Labs developed this graph to statistically aid Fisher Body inspectors in standardizing visual judgements of the color of incoming material.

year. This, he says, is an indication that the manufacturers as a whole are more concerned with quality.

GM recently concluded a study to determine how the public measures quality. It was conducted in several phases by General Motors Resarch (GMR) which even hired outside clinical psychologists so that the study wouldn't reflect a GM bias.

Based on thousands of questionnaires and interviews with special focus groups, the study categorized new car buyers into four distinct groups with different definitions of quality. One advantage of this study is that GM can focus its advertising and marketing programs at these groups to appeal to their concerns and desires for quality.

Although few details of this study have been made public, two fascinating tidbits have come to light. The overriding quality concern of those interviewed was that they don't want their car to stall in an unsafe area, whether that's a busy intersection or a dark alley.

Second, one of the groups, which GM believes may represent as much as 15% of the car buying public, says that safety equals quality. If true, this shows that the automakers have been missing a significant opportunity. Contrast this, for example, to the advertising effort aimed at the performance market, which also represents about 15% of the total market.

Perhaps the most important aspect of this whole quality question, however, is how the domestic automakers were able to improve their quality. Just a few years ago they wouldn't have dared to use quality as a competitive yardstick.

The Japanese and European automakers had such superior quality that most executives in Detroit would just as soon never bring up the topic. Yet, the Power survey shows that Ford, for one, has been able to pull past a number of imports, although imports admittedly still dominate the top of the list. And as the Power survey also shows, the imports' quality level is a moving target.

Nonetheless, it would seem that the industry's recent emphasis on qualty circles among its hourly employees, the increasing use of statistical quality control and better efforts at improving dealer service is beginning to pay off. Perhaps even more important is the attention that top management is personally devoting to quality.

In the long run, the new emphasis on quality could result in higher productivity, better labor relations and more satisfied customers. But for the time being, it would appear that quality is going to be an aggressive marketing yardstick. ■

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INDUSTRY ANALYSTS:

WELCOME TO EASIER TIMES

AI contacted the major industry analysts and research associations to get a concensus on the direction of the US auto industry. Their answer: the industry is picking up, inching toward (and maybe past) 10 million new car sales and more than 3 million light truck sales, although storm clouds may be ahead.

by Andrew M. Andrews

There's a war being fought, as the economy brightens, to reach today's car buyer with a package that gives him what he wants. Analysts are having a field day predicting what's in store for a more healthy industry.

But clouds of uncertainty hang over the automakers. Will import restraints continue, and if so, at what rate? How big is the performance car market? How big is the mini-van market? Will buyers continue to go "up-market"? How will CAFE (Corporate Average Fuel Economy) standards be met if consumers insist on buying larger, less fuel efficient cars?

Restraints Are Key

At press time, negotiations continue over the Japanese voluntary import restraints. It seems certain that some form of restraint will continue, but the exact level of the restraints is uncertain. Yet some analysts see continued restraints, in any form, as bad for the consumer, and eventually, for the industry.

"The expected extension of voluntary Japanese import restraints will ultimately lead to higher passenger car prices, thereby curtailing sales somewhat," says Wesley Stuchlak, manager, North America market analysis for Chase Econometrics.

Other analysts disagree. "The Japanese have been pretty good at holding the price umbrella up," explains Ann C. Knight of Paine Webber.

"The Japanese are highly restrained," says Stuchlak. "But sales rates in general are going up. The Japanese will have a slightly higher quota after March 1984, but sales rates for the industry will be so much higher that they [Japanese cars] will be in extremely short supply.

"They will have no choice but to bring in higher priced cars, raise the prices on

Analysts See Steady-State Growth In Sales (in millions)

	Merrill Lynch	Chase Econometrics	Research Bernstein	Data Resources	Automotive Information Council	Predicasts, Inc.	Prescott Ball & Turbin	Paine Webber	AP Parts
PASSENGER CARS									
1984 US Production	7.5	7.5	7.8	—	7.5	10.5	7.5	10.35	7.35
1984 Sales, US & Imports	10.3	10.4	10.3	10.6	10.0	7.45	10.3	10.5	10.1
LIGHT TRUCKS									
1984 US Production	2.5	2.6	2.8	—	2.4	—	2.6	2.9	2.42
1984 Sales, US & Imports	3.1	3.2	3.2	3.4	2.7	—	3.1	3.4	3.1

Source: AI Marketdata

everything, put in higher levels of equipment—anything they can do to capitalize on the fact that they've got a very hot product and [consumers] can't get enough of it."

In recent years, Stuchlak says, the Japanese have shipped more up-scale or sportier cars to the US. But the Japanese will not abandon any particular marketplace, he says. "On the contrary, they want to maintain a presence in as many market segments as they can."

Two Automakers Lag

While GM turns in its best third quarter ever, Chrysler rebounds nicely and Ford hangs tough, the financial atmosphere in Detroit appears rosey...except for VWoA and AMC. Analysts explain that these two car companies can be held responsible for bad sales because of bad pricing and cheaper, identical offerings from competitors.

"AMC has spent a lot of money for tooling costs, and they've had to amortize some of that debt," Stuchlak says. It will be "maybe 1984 before they'll show a profit."

VWoA is starting to recover from the virtual death of diesel sales, yet Stuchlak claims the company's future prospects still aren't that great.

"Looking at the 1985 Rabbit, it doesn't look to be that much of an improvement over the existing Rabbit," he says.

CAFE Under Gun

In 1984, CAFE standards will be under the gun from GM and Ford, which are fast using up accumulated credits. If the American penchant for relatively big cars continues, something has to give.

"The question is whether we'll just eliminate the penalties," Stuchlak says. "Somehow they'll be eliminated. They're talking big dollar amounts for Ford and General Motors.

"On the other hand, that's going to tick off Chrysler because *they've* met CAFE and have downsized almost all their cars."

Yet Paine Webber's Knight says there are ways to get around CAFE. "There are lots of loopholes under the enabling legislation," says Knight. "And why shouldn't GM and Ford try to wiggle their way through some of the loopholes?"

Knight says the battle will continue, with the manufacturers trying to find loopholes and the "EPA types" trying to close up the loopholes.

"The EPA has taken on a kind of political life of its own," she says. "And I don't think a presidential election is going to change it much, one way or the other."

Chase Econometrics says the increased demand for more luxury and sports cars is tied intimately to the stability of gasoline prices. This trend should continue.

"Gasoline price increases will be slower than the overall rate of inflation," Stuchlak says. "So with declines in the real price of gasoline, conventional wisdom has it that people would want to buy larger cars. That's fine, except that GM, Ford and Chrysler are all limited in their large-car capacity right now.

"In the wake of the gasoline price and availability problem, some people are switching back to larger cars," Stuchlak continues. "In our current forecast, we expect that gasoline prices will edge down in 1984 and possibly in 1985, depending on how much demand for gasoline products remains depressed."

Lower-Income Buyers Attracted

According to Peggy Pentecost of the Automotive Information Council, "AIC believes consumers are ready to buy new cars." She says an industry survey made earlier this year asked consumers whether they believed the next 12 months would be a good time to buy a car. Two-thirds of the families surveyed "held favorable car-buying attitudes."

As the economy continues to recover, the forecast looks good for sales to lower and lower/middle income groups. They were hit hard during the recent recession, and many analysts agree that the recovery won't reach full stride until automakers give them what they want.

"We don't expect people to become as insensitive to price in this recovery as they had been in the '60s," says Knight. She says overall "utilities," such as size of car, performance and price, determine what many families buy today.

But the perception of the "typical car buyer" is changing, according to Stuchlak. Demographics favor a strong luxury car market. The US now includes more affluent families. "People from the baby boom generation are entering their peak earning years now," he says.

Light Truck Competition Hot

New car and light truck sales "will continue on an upward swing stimulated by manufacturing promotions and innovative financing—interest rates in the 12-13% range," according to Karl Motter of AP Parts. "As consumer confidence builds and confidence in the economic recovery solidifies, consumers will project this momentum in their purchases of new cars and trucks. Assisting new truck sales will be the new downsized versions of vans and the like."

Chase's Stuchlak says the light truck market should remain "very price competitive, however, due to the large number of competitive products and excess production capacity, especially in the pickup segment."

Diesel Sales Dismal

The one automotive segment that continues in the doldrums is the diesel car market. Diesels will not sell, say the analysts, because the gasoline engine has made such huge strides in fuel efficiency.

A prime example is Honda's Civic CRX Coupe which is EPA rated at 51 mpg (4.6 L/100 km). That figure easily tops VW's Rabbit diesel, rated at 47 mpg (5.0 L/100 km) and the perennial fuel economy champ.

Fuel prices also offer disincentives for buying a diesel. "Diesel fuel is priced just about on top of gasoline," Stuchlak says. "There's not the big differential there used to be."

According to Knight, most consumers view diesels as "more expensive and unreliable, and the fuel is more expensive than gasoline."

She is very concise in her explanation of the diesel's lack of popularity: "The reason they're disappearing is that nobody wants them. They've been surpassed in technology by other engines." ■

Motor Vehicle Mfgs Assoc.	Citicorp Information Services	Arthur D. Little	AVERAGE
—	—	10.2	8.47
10.3	10.5	7.6	9.86
—	—	3.1	2.67
3.38	—	2.3	3.09

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CHILTON'S 1/1984

AUTOMOTIVE INDUSTRIES

In this issue: TRUCK & OFF-HIGHWAY INDUSTRIES

C2150-3 1/30/84

PROJECT SATURN

GM's High Tech Salvo In The Small Car War

Are We Overdosing On Automation?

How To Glue A Car Together

Including **Truck & Off-Highway Industries**

AUTOMOTIVE INDUSTRIES

January, 1984/Volume 164, Number 1

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Nearly everyone agrees that automated assembly will be a boon to industry during the next decade. But caution reigns in this critical first robot decade.

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COVER

GM shoots for the moon, or even beyond, with advanced manufacturing techniques and a import-fighter for the late '80s. Is it real, or just science fiction?

NEXT MONTH

Our Man of the Year issue also details goings-on at the SAE Expo, and the manufacturing techniques Harley-Davidson is using to become more competitive.

QUOTABLE

"Honda is playing to a different drummer than all the other motorcycle and car manufacturers in that they're very committed to manufacturing in the countries in which they do business. I believe the [Marysville, OH] motorcycle plant was really a pilot operation for their automobile plant. I believe the engine plant that they have just announced for motorcycles is a pilot plant for automotive engines."—Vaughn Beals, CEO of Harley-Davidson Motor Co., speaking at a press conference at the company's York, PA assembly plant.

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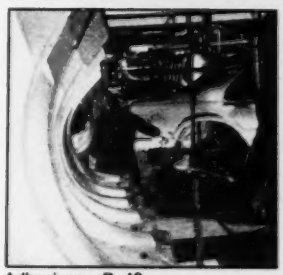

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ONE OF THE ABC PUBLISHING COMPANIES

GM Productivity Shows Recent Jump

General Motors' productivity rate, which remained fairly constant from 1973-1978, suddenly jumped 21% between 1980-81 and second quarter '83, according to a report by Goldman Sachs Research. The firm tabulated total manhours from GM's average number of US hourly employees, total US payroll and average hourly earnings (excluding benefits). When these figures were tallied in with car and truck production, units per thousand manhours were calculated. While the figures generated are higher than usual for manhours per car, the methodology remains constant from year to year and the findings in regard to productivity are therefore valid. Goldman Sachs says manhours per unit were 173 in 1969; in second quarter '83 they were 136, hence the 21% improvement. The firm says this improvement didn't come gradually over the years but occurred mostly during this decade.

The report also points to the "staggering cash flow coming out of GM." By 1985, the firm predicts cash flow could exceed $40 per share, with capital spending in the $22 per share area. This would leave $18 per share in excess cash flow, or $5.7 billion. In 1978, GM's last peak year, excess cash flow amounted to only $1.9 billion.

US Retail Sales, 1982-1984
(thousand units)

	1982		1983		1984	
	units	% of total	units	% of total	units	% of total
General Motors	3515	44.3%	4095	44.7%	4709	45.5%
Ford	1346	16.9%	1608	17.6%	1869	18.0%
Chrysler	692	8.7%	870	9.5%	1035	10.0%
American Motors	112	1.4%	191	2.1%	217	2.1%
VWoA	91	1.1%	86	0.9%	101	0.9%
Total domestic	5757	72.2%	6850	74.9%	7925	76.6%
Imports	2222	27.8%	2300	25.1%	2425	23.4%
Total	7979	100.0%	9150	100.0%	10350	100.0%

Source: Goldman Sachs Research

DRI Eyes World Market

The largest and most mature car markets continue to fuel the uneven world automotive recovery, with the US leading the way, according to DRI Europe Ltd. While the fastest rates of growth center in the Asia/Pacific and Middle Eastern markets, these areas start from a very low base. Once highly regarded for its medium term potential, Latin America will "mark time until late in the decade" because of its current debt dilemma, says DRI. Western European demand remained incredibly stable throughout the recession, and so the Continent will witness the slowest new sales growth as the world market rebounds, according to the report

The car production share currently held by North America and Western Europe will decline as Asia/Pacific and Latin America emerge as net exporters late in the decade. Even Japanese producers will be obliged to look to the export of knock-down sets for assembly in the consuming country rather than exporting complete cars to achieve future growth.

	New Car Sales (in millions)			Car Production (in millions)		
	1983	1984	1988	1983	1984	1988
West Germany	2.42	2.47	2.62	3.86	3.94	4.23
France	1.99	1.90	2.11	2.84	2.82	2.83
United Kingdom	1.77	1.66	1.70	1.05	1.02	0.96
Italy	1.59	1.67	1.73	1.44	1.48	1.62
Total Western Europe	10.40	10.44	11.26	11.06	11.15	11.63
United States	9.27	10.45	11.76	NA	NA	NA
North America	NA	NA	NA	7.82	8.92	9.31
Japan	3.16	3.26	3.50	7.15	7.46	8.16
Total World	29.54	31.27	35.23	NA	NA	NA

NA=not available

Source: DRI, Nov. '83

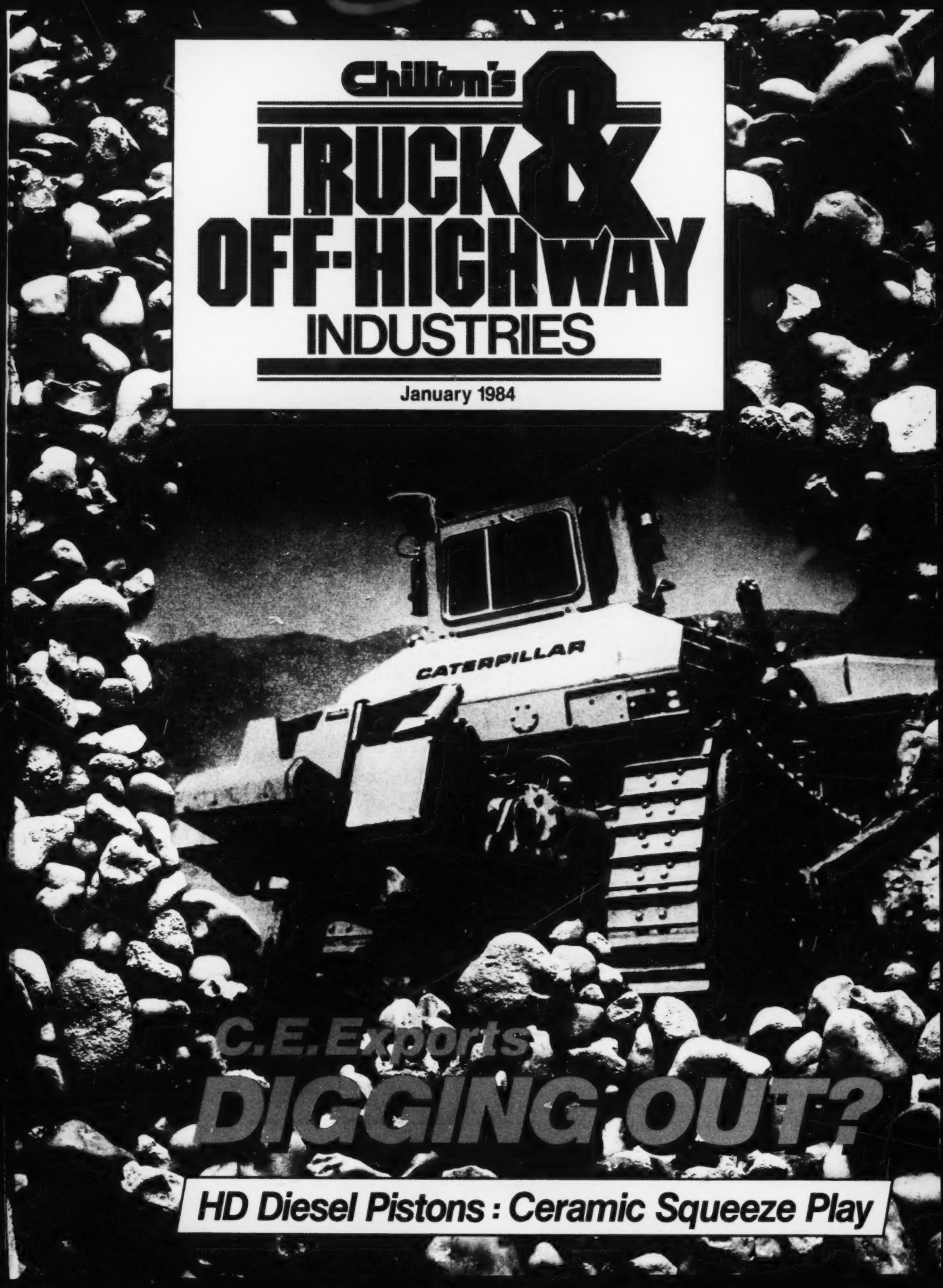
B-W/Clark Clutch Joint Venture

Borg Warner Corp. and Clark Equipment Co. are seriously considering setting up a joint venture to build and market manual transmissions and clutches. The venture should be formalized by the end of the first quarter, according to a B-W spokesman. As to the types of trannies to be included, the spokesman says it's still up in the air because "we don't know yet what's going to fall out of this thing." Borg-Warner builds automotive transmissions while Clark's known for its medium-duty truck transmissions, and off-highway powershift transmissions and axles. The joint venture would include facilities of both companies in the US, Mexico and Brazil.

Chilton's

TRUCK & OFF-HIGHWAY INDUSTRIES

January 1984



C.E. Exports DIGGING OUT?

HD Diesel Pistons : Ceramic Squeeze Play

Chilton's

January, 1984

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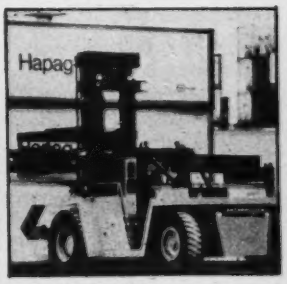

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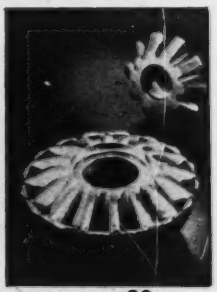

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COVER

HD manufacturers continue to dig for export markets while fighting imports at home.

NEXT ISSUE

TOHI ***charts the trends in the American heavy truck industry.***

C.E. EXPORTS

DIGGING OUT?

1981 was the last year of 'great exportations' for US construction equipment manufacturers. The subsequent downturn and massive shakeout has redefined the gobal market for US exports away from red-hot expansion and toward cool-headed efficiency.

J.I.Case, the third largest manufacturer of construction equipment worldwide, has streamlined product and stands poised to respond to the changing export market quickly.

By Lance A. Ealey
and Douglas Williams

Will 1981 remain the all-time levee-buster in terms of construction equipment export sales? That year, 132,865 pieces of construction equipment and related components were exported, worth $6.3 billion. What followed is an oft recited litany of devastation worthy of Edgar Allen Poe.

In recession-plagued 1982, exports plunged 37% to 106,006 pieces worth $3.97 billion, and first half 1983 returns, 50% below the figures attained in 1982, are rebounding with the resilience of a dropped anvil. ("For the first time in history, all of our markets were down simultaneously," says a Caterpillar spokesman.)

Unlike the American automotive industry, exports are big business for most US construction equipment companies. "Traditionally, they've represented half our volume of business," says Cat's spokesman.

Some of the current export tumble results from the recent worldwide recession, he explains, adding, "Exports of construction equipment aren't going to mount rapidly when countries formerly carrying out long term planned national development programs have substantially curtailed them."

And subtly profound changes are taking place in this vital segment. "In past recoveries, heavy goods, durables, machinery, have been a major part of the recovery," he continues. "As our chairman noted not long ago, that hasn't been so evident this time. Some of it can be attributed to the strong dollar, but a lot of it has to do with the fact that other economies around the world now have the strength and capabilities to provide goods and services that we formerly exported. The US no longer has an exclusive on goods and services that used to be sold abroad."

"There are more manufacturers in more countries," agrees Frank Merrill, VP of International Operations for Barber-Greene. "And the current exchange rate isn't that terrific for us, either."

Cliff Young, an analyst for Arthur D. Little Inc., says another possibility for the current slump is "the US government restrictions on the pipeline equipment for the USSR. A lot of construction equipment manufacturers were anticipating to get a fair amount of overseas shipments for that work."

As for the plight of American CE companies today, Young states, "It's more a question of how important are the *imports* of construction equipment into the US. US manufacturers should be aiming at the domestic market for survival and prosperity. Imports [are] eroding the market share of the US producers. If you're not competitive in your domestic market, then how can you hope, with the strong dollar, to be effective in export markets against the same competition?"

The telling point of this argument is that virtually every serious entrant in the heavy-duty game is deeply into the integration of manufacturing on a worldwide scale.

J I Case, Eaton, Deere...every manufacturer dedicated to success in the business is putting more and more offshore manufactured parts into traditional products from tractors to transmissions.

Caterpillar lift trucks will be made by Koreans "to Caterpillar design and quality." Consolidated Diesel and Onan manufacture small and medium diesels in the US, but use parts made in Europe and the Far East.

And, as Young points out, US CE companies haven't exactly been drag-

ging their feet in terms of manufacturing prowess. "It's ironic, but if you look at the introduction of new manufacturing technologies, things like flexible manufacturing systems, the introduction of group technology principles and other automation methods close to the state of the art, it seems the farm and construction equipment people in the US have been up at the forefront," he says.

"You see the same names all the time—Caterpillar, Harvester, John Deere—they've been investing very heavily under the adverse conditions we've been feeling, and they've really been at the forefront of introducing new technology."

The manufacturers say that survival in the tough global market demands dedication to becoming "the low cost producer." It was barely 5 years ago that the phrase started to become widespread. Back then, you heard more talk about market share. Today in the export market, "Your share of nothing is nothing," gibes Barber-Greene's Merrill.

A popular Cat export machine is the 973 track loader, introduced in 1982. Its rear 210-hp engine and hydrostatic drive allow a breakout force of 16,230 lb.

Cost Effectiveness Begins At Home

As Arthur Little's Cliff Young noted earlier, the struggle toward cost effectiveness in the world market begins at home. A good example of this is the recent dog and pony show put on by the world's biggest construction equipment company, Caterpillar. In the fall, the top executives at Cat traveled to San Francisco, Chicago and New York to meet with financial executives.

In a most unusual move, they then made essentially the same presentation in Caterpillar's hometown of Peoria to anyone interested. The talks were carried live on local television.

Robert E. Gilmore, president and chief operating officer, said, "Basically we're implementing programs that will place our 1986 cost levels more than 20% below those of 1981."

Four specific targets areas are: material costs; labor costs; in-process inventory; and the size and number of facilities Caterpillar operates, Gilmore said.

"In the average American company, process inventory is being worked on only around 5% of the time. We've traditionally been about twice that efficient, adding value about 10% of the time," Gilmore said.

"Even so, that means that 90% of our inventory is idle, waiting to be worked on, costing money the whole time," he

(Continued)

CIMA—A Look At The Ecomony In Scale

Perhaps a better perspective can be gained on the CE export market by looking at the entire US economy. Dr. Roy Moor, senior VP and chief economist with the First National Bank of Chicago, told the annual meeting of the Construction Industry Manufacturers Assoc. (CIMA) recently something that most were at least vaguely aware of. "Beginning sometime in 1979 we have had a rationalization of the US economy" with the weaker companies being "merged, acquired and bankrupted." Divisions and assets have been sold off, the net result being increased price competition in every industry, Moor said, adding, "It's been a fundamental change in the US economy."

Everyone has heard the bad news, he said. But the good news is that "ours is the only economy in the world that has gotten more efficient; much much more efficient than in 1979," he told the CIMA executives.

Economist Moor makes firm projections on the US economy, hedged less than is common among market diviners. For example, he projects "through 1988 energy prices will stay right around where they are now." That's based on two assumptions. One is that there is no major outbreak of war in the Middle East such as an attack on Saudi Arabia or the closing of the Strait of Hormuz.

The second assumption, which is half prediction itself, is that the demand for energy worldwide will rise at a very, very slow rate. Then too, "it will be offset, particularly in the US, by increases in conservation," he said.

Given how fundamental energy and energy prices were in the economic disasters of the last decade, Moor's projections could be basic to whatever happens in the heavy-duty world for 1984 and beyond.

But as significant as energy is, inflation may be more important. And Moor's even more bullish about inflation (at least in the sense that the worst is behind us).

"Unlike 1980-81-82 when interest rates were declining rapidly, we have entered into a long term trading range" where interest rates probably will stick within a 3% range. "We are probably in the middle of that now. Interest rates are going to stay around these levels until 1989," he predicted.

As an adjunct to that, he sees the dollar weakening, but only slightly, through 1984. Then "it is likely to stay the rest of the decade where it ends 1984."

In terms of more specific predictions, he said, "Most major industrialized economies in the world will experience growth in 1984. In almost all cases, though, that will be less than what we in the US experienced in 1983."

When it comes to costs on a company-by-company level, his expectations are less bright.

"We can expect very few price increases between now and the end of the decade," Moor said. His reasoning follows the belief that purchasers have changed their attitudes towards price increases from what they were in the 1970s, when product was bought in spite of price increases because of the fear that prices would increase even further. "In the '80s, the consumer has decided that if there are any price increases, he'll cut back on his spending.

"There's also been a weeding out of weaker competitors in almost every industry, leaving only the stronger competitors which has increased competitive pressures, which in turn has resulted in much more acute price competition."

"All of us in this room learned our business lessons in the '60s and '70s, Moor told CIMA. "That was a distorted world and it was distorted by inflation."

Businesses grew in the '70s largely through leverage, borrowing and then paying back with cheaper dollars.

"Cost management, unlike the '70s, now becomes the name of the game," Moor said. ■

—L.A. Ealey and D. Williams

C.E. Exports

Construction Equipment Projections

	1979 Sales	1982 Sales	Prct. Change '83 to '82	Prct. Change '84 to '83
Crawler Tractors	19,500	7,050	+ 5%	+26%
export	6,900	3,100	−29%	+ 6%
Large Wheel Tractors	5,000	3,400	+ 6%	+25%
export	2,300	735	−55%	+22%
Crawler Loaders	6,300	1,400	+40%	+20%
export	1,100	500	−25%	+ 7%
4WD Loaders	21,600	7,600	+ 5%	+23%
export	3,900	2,100	−25%	+ 7%
Earth Scrapers	4,100	1,200	same	+20%
export	1,300	470	−50%	+ 6%
Graders	7,300	4,000	same	+25%
export	2,200	1,400	−28%	+13%
Hydraulic Excavators	5,700	1,800	+15%	+20%
export	1,200	320	−10%	+10%
Wheeled Hydraulic Cranes, (Multi-station)	2,900	2,400	−50%	+20%
export	360	360	−33%	+10%
Wheeled Hydraulic Cranes, (single station)	5,400	2,200	−55%	+20%
export	1,950	1,100	−40%	+13%
Lattice Boom Cranes	1,750	550	−40%	+25%
export	490	230	−30%	same
Average For All Groups	7,955	3,160	− 7%	+22%
export	2,170	1,032	−33%	+ 9%

Note: Exports are included in the larger total.
Source: 1979 and 1981 sales figures from Bureau of the Census. Anticipated changes for 1983 and 1984 as reported to CIMA by 39 manufacturers.

Caterpillar's hardball approach to world market competitiveness has kept the company healthy, despite irritations like the strong dollar and increased domestic market competition.

said. "Reducing that inventory saves material costs, expensive space and forces the company to use facilities and equipment more efficiently.

"Caterpillar's goal is to increase inventory turnover from four times a year to six times a year," Gilmore revealed. "All Caterpillar plants are forecasting turnover rates above five by 1984. When we reach our 1986 goal, and we will reach it, we will have achieved a permanent in-process inventory reduction of 37%."

Purchasing is another area Cat is tightening up. The East Peoria plant traditionally allowed suppliers 20 days leeway in delivery to be "on-time". That's now shortened to under 10 days.

Maintaining Export Share

One fortuitous result of the last 4 years is that the survivors in the world market stand poised to glean reapings from any uptick that market bears.

But maintaining export market share can be tough. "You're not talking about an individual market," notes Young, "you're talking about the composite of a whole series of world markets. In each of the export markets you have to set up the right sort of infrastructure to be able to address the needs of those markets in terms of sales support and service support, which can be very costly."

It's also true that the rules of the export sales game in some developing countries can be, well, unusual. "Their methods of conducting business also detract companies from wanting to get too heavily involved," says Young. "Having to buy contracts—it's not something you like to do, but it becomes part of the way of life in some Third World countries. If you want a share of that market when, hopefully, those developing countries become more mature in outlook, you have to show a presence now."

As for the future of CE exports, a Caterpillar spokesman says, "We've seen some encouraging signs, particularly in the US and other industrialized economies. However, in much of the world, including areas where we traditionally have sold many machines, economies continue to be down, so we continue to be cautious about the recovery."

Arthur Little's Young says the firm's projections call for around a 3½% compound annual growth rate for total construction equipment shipments from 1982 through 1992.

While gloom and doom generally prevail thoughout the CE export market, Young points to one possible bright spot on the horizon. "I think we can look forward to a loosening of the import restrictions that China has imposed so far. There's a feeling that by 1985-86, if the restrictions are lifted, there could be a doubling of the market in China. At the moment it's a tiny, tiny market, very small in proportion to total sales, but the potential for that market in the future is immense." ■

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